

ROBERT CRAIG GROUP

Curriculum Vitae

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RESEARCH EXPERIENCE

Assistant Professor of Physics : University of Virginia 8/2010 – present
(Position joint with Fermilab)

Leader in the low-mass Higgs search at the CDF experiment and in R&D efforts for the cosmic ray veto system of the Mu2e experiment.

Research Associate: Fermilab 12/2006 – 8/2010

Contributed to the first observation of electroweak top quark production and the search for the Higgs boson produced in association with a W boson. Worked to expand the muon acceptance in these analyses and improve the purity of the muon triggers. Coordinated the simulation of event samples for the Higgs discovery group and served as convener for the Single Top and WH analysis groups. Directed undergraduate students on cosmic ray veto studies for the mu2e experiment, and a search for Higgs bosons decaying into two photons.

EDUCATION

Ph.D. in Physics, Dec. 2006. (GPA=4.0) Gainesville, FL
University of Florida
Advisor: Richard D. Field and Konstantin Matchev
Thesis: *Inclusive Jet Production using the Midpoint Algorithm in Run II at CDF*

M.S. in Physics, Aug. 2001. (GPA=3.8) Tallahassee, FL
Florida State University
Advisor: Harrison B. Prosper

B.A. in Physics, May 1999. Due West, SC
Erskine College

RESEARCH AND EXPERIMENTAL HIGHLIGHTS

CDF Experiment

Convener of the CDF Higgs Discovery Group: May 2011 - present

I am serving as the leader of the search for the Higgs boson at the CDF experiment. During my term we searched the full dataset from the Tevatron dataset and found a 2.5 sigma deviation that could be consistent with a standard model Higgs boson.

Convener of the $WH \rightarrow \ell\nu b\bar{b}$ analysis group: Sept. 2009 - May 2011

Over the few years we have improved the sensitivity of the $WH \rightarrow \ell\nu b\bar{b}$ by more than 50% beyond what is expected from adding additional luminosity. I led the effort to add many of these analysis improvements in order to give the Tevatron the best possible chance of finding evidence of the Higgs boson with its full dataset.

Convener of the single top group: May 2008 - Sept. 2009

Managed and coordinated the efforts of the single top analysis group of the CDF experiment. In my convenership we observed single top quark production for the first time, and made the most precise measurement to date of the single top production cross section and the CKM matrix element V_{tb} .

Led effort for UVa to join CDF experiment: Oct. 2010

The University of Virginia group is officially a member of the CDF collaboration.

Observation of electroweak single top production:

Directed a graduate student on the development of an analysis method employing boosted decision trees to search for single top production. Developed a method to take muon events which did not trigger the CDF data acquisition system by using an alternative trigger based on missing transverse energy and jets. This method to acquire additional signal acceptance improved sensitivity to single top by about 15 % and has been adopted by other groups at CDF. Combined the three single top results using a technique based on best linear unbiased estimators which resulted in an additional 9 % improvement to sensitivity. These efforts contributed to the first observation of electroweak single top production by the CDF experiment.

QCD studies 2005 - 2009

- Measured the inclusive jet cross section in the forward region of the CDF detector for the first time with a cone algorithm.
- Measured the properties of the underlying event in CDF collisions.

Mu2e Experiment: 2009 - present

- Level-3 manager for fabrication of the cosmic ray veto system.
- Led high school and undergraduate students on assembly and commissioning of a prototype cosmic ray veto detector for the mu2e experiment.

NOvA Experiment: 2012 - present

Convener offline computing group: June 2012 - present

Coordinate with the Computing Division to manage the offline computing needs and resources of the NOvA experiment.

HONORS AND AWARDS

Nominated as Mead Honored Faculty	2012
URA Visiting Scholar Award (for post-doc) The URA awarded Yuri Oksuzian an award of \$20,000 to support our groups efforts at Fermilab	2011
Outstanding Mentor Award DOE Office of Science, for mentoring students on the CDF experiment	2009
Alumni Fellowship Department of Physics, University of Florida	08/2002 – 08/2006
DPF Travel Award Awarded to attend the April APS meeting in Dallas, TX	Spring 2006
UF College of Liberal Arts and Science Travel Award Awarded to attend the Pheno 2006 meeting in Madison, WI	Spring 2006
DPF Travel Award Awarded to attend the April APS meeting in Tampa, FL	Spring 2005
REU Summer Research Fellowship Awarded for summer research at Florida State University	Summer 1999
Marsh W. White Award (Sigma Pi Sigma) For design of a functional Foucault pendulum to be displayed publicly at Erskine College	1999

MEMBERSHIP AND LEADERSHIP

- Higgs Analysis Group Co-convenor of CDF experiment (2011-2012)
- Tevatron New Phenomenon/Higgs Working Group (2011-2012)
- WH and Single Top Sub-group Co-convenor of CDF experiment (2008-2011)
- Executive Board member for the CDF Experiment (2011-2012)
- L3 manager of Fabrication for Cosmic Ray Veto of the Mu2e experiment (2011-)
- National Scholars Honor Society (inducted 2007)
- Phi Kappa Phi Honor Society (inducted 2006)
- American Physical Society (lifetime member)
- APS Division of Particles and Fields
- Philomathean Literary Society, President (1999), Vice President (1998)
- Kappa Mu Epsilon, Mathematics Honor Society, President (1999, Erskine College)
- Sigma Pi Sigma, Physics honor society (Erskine College)
- FNAL Garden Club (2007-2009)
- FNAL Golf League: Arrowhead League Champions 2008 and 2009

RECENT CONFERENCE TALKS AND SEMINARS

“Recent Results from the Tevatron”

The LHC, Particle Physics, and the Cosmos, Auckland, NZ, July 2012

“Tevatron Higgs Searches: Past and Future”

The Next Stretch of the Higgs Magnificent Mile, Chicago, IL, May 2012

“Higgs Boson Search Results Using the Full Tevatron Dataset”

Invited Talk APS April Meeting, Atlanta, GA, April 2012

“Charged Lepton Flavor Violation Discussion Summary Report”

Intensity Frontier Workshop, Rockville, MD, Nov. 2011

“The Impact of Higgs Searches at the Tevatron in the LHC Era”

– South Eastern section of APS (SESAPS), Roanoke, VA, Oct. 2011

– Physics Seminar, James Madison University, Oct. 2011

“Status and Summary of the Mu2e Experiment”

– Meeting of the APS Division of Particles and Fields, Brown University, Aug. 2011

– Fermi National Accelerator Laboratory, Users’ Meeting, June 2011

“Low-mass Higgs Searches at the Tevatron”

Workshop on Higgs Cross Sections for the LHC, Brookhaven National Laboratory, NY, May 2011

“Searches for New Physics at the Tevatron”

Plenary talk, DIS2011, Newport News, VA, April 2011

“Recent Studies of the Underlying Event from CDF”

Northwestern University HEP Seminar, Evanston, IL, May 2010

“The Race for the Higgs Boson”

March 2010

– University of Virginia physics colloquium

– University of Alabama physics colloquium

“Lighting up the Higgs sector with photons at CDF”

– Notre Dame HEP Seminar, Notre Dame, IN, November 2009

– University of Wisconsin HEP Seminar, Madison, WI, April 2009

“The Observation of Single Top Production at the Tevatron”

April 2009

– University of Victoria HEP Seminar, Victoria, Canada

– TRIUMF National Lab Seminar, Vancouver, Canada

“Recent QCD Results from the Tevatron”

January - February 2008

– XXII Rencontres de Physique de la Vallée d’Aoste, La Thuile, Italy

– Argonne HEP Seminar, Argonne National Lab

Robert Craig Group

PUBLICATION LIST

Publications in Refereed Journals

- [1] “*Combined search for the standard model Higgs boson decaying to a bb pair using the full CDF data set.*”, Submitted to PRL, arXiv:1207.1707
- [2] “*Search for the standard model Higgs boson decaying to a bb pair in events with one charged lepton and large missing transverse energy using the full CDF data set.*”, Submitted to PRL, arXiv:1207.1703
- [3] “*Search for the standard model Higgs boson produced in association with a W^\pm boson with 7.5 fb^{-1}* ”, Submitted to PRD, arXiv:1206.5063
- [4] “*Search for a Higgs Boson in the Diphoton Final State in $p\bar{p}$ at $\sqrt{s} = 1.96\text{ TeV}$* ”, Phys. Rev. Lett. 108, 011801 (2012)
- [5] “*Search for a Higgs Boson produced in Association with a W Boson Using a Method Based on Matrix Element Techniques*”, Phys. Rev. D. 85, 072001 (2012)
- [6] “*Observation of Single Top Quark Production and Measurement of V_{tb} with CDF*”, Phys. Rev. D. 82, 112005 (2010)
- [7] “*Measurement of the $WW+WZ$ Production Cross Section Using a Matrix Element Technique in Lepton + Jets Events*”, Phys. Rev. D. 82, 112001 (2010)
- [8] “*Studying the Underlying Event in Drell-Yan and High Transverse Momentum Jet Production at the Tevatron*”, Phys. Rev. D. 82, 034001 (2010)
- [9] “*Measurement of the WW and WZ production cross section in $\ell\nu jj$* ”, Phys. Rev. Lett. 104, 101801 (2010)
- [10] “*Search for Standard Model Higgs Bosons in $WH \rightarrow \ell\nu b\bar{b}$* ”, Phys. Rev. Lett. 103, 101802 (2009)
- [11] “*Observation of Single Top Quark Production*”, Phys. Rev. Lett. 103, 092002 (2009)
- [12] “*Search for a Fermiophobic Higgs Boson Decaying into Diphotons at CDF*”, Phys. Rev. Lett. 103, 061803 (2009)
- [13] “*Measurement of Single Top Quark Production at CDF*”, Phys. Rev. Lett. 101, 250601 (2008)
- [14] “*The Inclusive Jet Cross Section Using the Midpoint Algorithm in RunII at CDF*”, Phys. Rev. D78, 052006 (2008)

In addition to the publications listed above, I have been a member of the CDF author list since January 2006 with over 250 publications and more than 8500 citations (based on the SPIRES - High-Energy Physics Literature Database). I have also made major contributions to almost 100 unpublished notes documenting my work for the CDF, Mu2e, and NOvA collaborations.

Conference Proceedings and Non-refereed Publications

- [1] “*Updated Combination CDF and D0 Searches for Standard Model Higgs Boson Production with up to 10.0 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1207.0449 (2012)
- [2] “*Fundamental Physics at the Intensity Frontier*”, Intensity Frontier Workshop, arXiv:1205.2671 (2012)
- [3] “*Combined CDF and D0 Search for Standard Model Higgs Boson Production with up to 10.0 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1203.3774 (2012)
- [4] “*Combined CDF and D0 measurement of WZ and ZZ production with b-tagged jets*”, Tevatron Electroweak Working Group, arXiv:1203.3782 (2012)
- [5] “*Status of Higgs Boson and Other New Physics Searches at the Tevatron*”, Contributed to the proceedings of XIX International Workshop on Deep-Inelastic Scattering and Related Subjects, Newport News, VA, 2011
- [6] “*Combined CDF and D0 Upper Limits on Standard Model Higgs Boson Production with up to 8.6 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1107.5518 (2011)
- [7] “*Combined CDF and D0 upper limits on Fermiophobic Higgs Boson Production with up to 8.2 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1109.0576 (2011)
- [8] “*Combined CDF and D0 Searches for the Standard Model Higgs Boson Decaying to Two Photons with up to 8.2 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1107.4960 (2011)
- [9] “*Combined CDF and D0 Upper Limits on Standard Model Higgs-Boson Production with up to 6.7 fb^{-1} of Data*”, Tevatron Electroweak Working Group, arXiv:1007.4587 (2010)
- [10] “*Higgs Boson Searches at CDF*”, Contributed to Lake Louise Winter Institute, arXiv:0905.4267 (2009)
- [11] “*Combination of CDF and DØ Single Top Quark Cross Sections Measurements*”, Tevatron Electroweak Working Group, arXiv:0908.2171 (2009)
- [12] “*Combination of Single Top Quark Production Results from CDF*”, Contributed to ICHEP 2008, arXiv:0809.4670 (2008)
- [13] “*Recent QCD Studies at the Tevatron*”, Contributed to XXII Rencontres de Physique de la Vallée d’Aoste, arXiv:0804.4494 (2008)
- [14] “*PDF use from the Tevatron to the LHC*”, Contributed to TeV4LHC workshop, QCD Group Report, hep-ph/0605240 (2005)
- [15] “*Slepton Mass Measurements at the LHC II*”, Contributed to TeV4LHC workshop, Exotics Group Report, hep-ph/0608322 (2005)
- [16] “*Slepton Mass Measurements at the LHC*”, Contributed to Linear Collider Workshop, hep-ph/0507002 (2005)
- [17] “*PYTHIA Tune A, HERWIG, and JIMMY in Run 2 at CDF*”, Contributed to Hera and the LHC workshop, hep-ph/0510198 (2005)
- [18] “*The Les Houches Accord PDFs (LHAPDF) and LHAGLUE*”, Contributed to Hera and the LHC workshop, hep-ph/0508110 (2005)